

Thermo Scientific AquaSensors  
DataStick measurement system  
for universal plug & play

## Thermo Scientific AquaSensors DataStick

### AquaChlor Free Chlorine Sensor and Monitoring System



#### Markets/Applications

- Drinking water
  - Production & distribution
- Food & beverage
  - Monitor sanitized process water
  - Monitor sterilization of glassware
- Reverse osmosis/ultrapure water
  - Chlorine damages filter membranes

#### AquaSensors DataStick™ AquaChlor™ Free Chlorine System

- Free chlorine
- Amperometric measurement
- Temperature compensated
- Optional automatic pH correction
- Pre-calibrated
- Plug & play
- Rugged Teflon® membrane
- Replaceable membrane cap
- Remote measurement, calibration, configuration, and diagnostics
- Turnkey AquaChlor monitoring system

This free chlorine sensor will measure accurately in processes that are between 4 and 9 pH.

When used with the Thermo Scientific AV38 Local display unit and a pH measurement system, measured hypochlorous acid (HOCl) and hypochlorite ion (OCl<sup>-</sup>) concentration can be used to determine free chlorine present.

Engineering Specifications

1. The free chlorine measurement system shall employ the amperometric measurement technique, using a gold cathode and silver cathode.
2. The sensor shall have hex-shaped wrench flats to facilitate mounting, and shall continuously measure hypochlorous acid (HOCl) and temperature in water to determine free chlorine concentration. When combined with pH measurements the sensor shall also determine total free chlorine concentration.
3. The sensor shall sample continuously at a user-regulated flow rate between 200 and 250 mL per minute, and automatically pH compensate over process solutions between 4.0 and 9.0 pH.
4. The system shall be a reagent-free design, requiring no additional buffers or indicators for free chlorine measurement.
5. The system shall display free residual chlorine from 0-5, 0-10 or 0-20 ppm on a LCD display with backlighting.
6. The minimum detection limit shall be 5 ppb or 0.005 mg/L HOCl.
7. The accuracy shall be less than 2% or  $\pm 10$  ppb of the measured value, whichever is greater.
8. The sensor shall have an integral temperature sensor to measure temperature independently.
9. The analyzer shall automatically compensate for sample temperature that shall be between 0° and 45 °C.
10. The calibration method for the analyzer shall be comparison with the approved lab method.
11. The local display/controller enclosure shall be rated at NEMA 4X.
12. The sensor shall have a built-in pre-amplifier, universal signal conditioning electronics, universal engineering units conversion, and interactive communications with a host computer or display interface using one of several protocols including Modbus® RTU, DeviceNet Profibus, USB, CANopen or Ethernet IP.
13. The system shall have two isolated 4-20 mA analog outputs that can represent the measured free chlorine as well as measured pH (if pH sensor is also used). Temperature may also be assigned to one of these outputs.
14. The system shall have two available relays that can be selected to operate as a control, alarm, or timer relay.
15. The Thermo Scientific AquaChlor™ System shall be AquaSensors Model AQC-series with Free Chlorine DataStick and optional pH DataStick.

Thermo Scientific DataStick Analytical System

The diagram illustrates the Thermo Scientific DataStick Analytical System. It features a central 'universal sensor module' that can be connected to various 'interchangeable communication adapters' and 'interchangeable sensor heads'. The communication adapters include PLC, PDA, PC, SCADA, DCS, and AV38 Local Display (4-20 mA and Relays). The communication protocols supported are MODBUS, USB/RS-232, RS-485, PROFIBUS, MODBUS, and DEVICENET. The interchangeable sensor heads include TOROIDAL, RESISTIVITY, CONDUCTIVITY, OZONE, ORP, DO, and pH. A photograph shows the AquaChlor System with a Free Chlorine Sensor Head and a DataStick module installed. Below the diagram, three key components are detailed: the DataStick, the Communications Adapter, and the AV38 Local Display.

**Key Components**

**DataStick**  
Provides universal conversion of sensor signals and interactive communications for measurement, calibration, configuration and diagnostics.

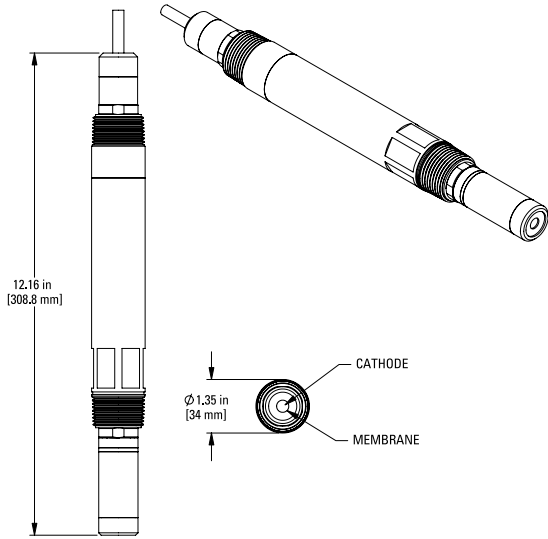
**Communications Adapter**  
Plugs into the DataStick to provide power and direct interactive communications with control systems.

**AV38 Local Display**  
2 line display and 7 key navigation. Data reporting with up to 2 current outputs. 2 Form C relays. Digital communications.

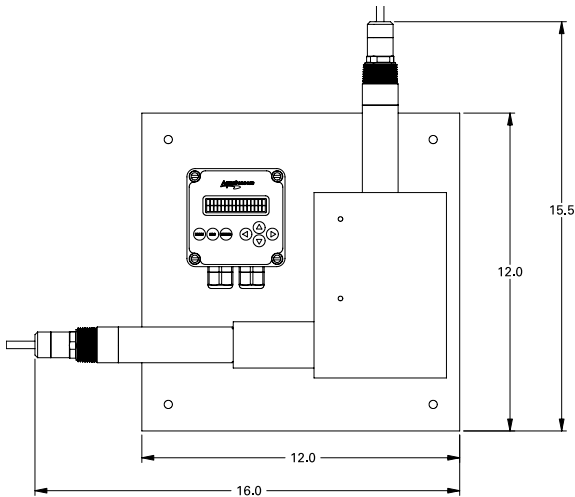
**AquaChlor System**  
With Free chlorine and pH modules installed.

**Free Chlorine Sensor Head**  
Pre-calibrated for free chlorine and temperature. Can be plugged into any DataStick™ to yield accurate 24-bit data.

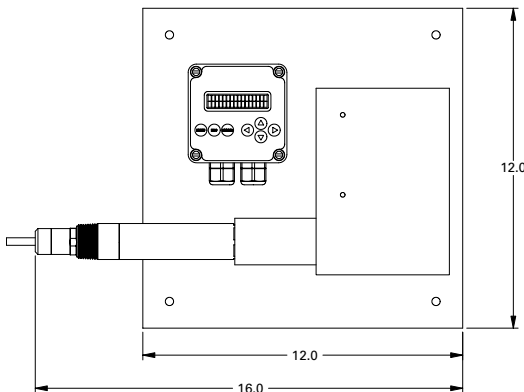
**Thermo Scientific AquaSensors Free Chlorine DataStick Data Sheet**



Provides universal conversion of sensor signals and interactive communications for measurement, calibration, configuration and diagnostics. Mounting adapters, junction boxes and recharge kits are available.



AquaChlor System with free chlorine and pH DataStick sensors installed.



AquaChlor System with free chlorine DataStick sensor only.

**Specifications**

**Measurement System Performance**  
**Ranges:** 0 to 5 ppm and 0 to 20 ppm  
**Resolution:** 0.005 ppm  
**Accuracy:** 2% or ±10 ppb (whichever is greater)  
**Step Response Time:** 90% in 90 seconds

**Operational Environment**  
**Temperature Range:** 0 °C to 45 °C (32 °F to 113 °F)  
**Maximum Pressure:** 15 psig @ 45 °C  
**System Flow Rate in Chamber:** 200 to 250 mL/min

**Free Chlorine Operation**  
 When chlorine and pH DataSticks are connected to the AV38 local display, HOCl and ClO<sup>-</sup> dissociation curves are pH compensated and used to calculate free chlorine present. A stable pH value can also be entered manually.

**Power Requirements†**  
**Voltage Range:** 10 to 30 VDC  
**Maximum Power:** 200 mW  
**Typical Power:** 120 mW

**Construction**  
**Process Electrodes:** Gold cathode, silver anode  
**Membrane:** Teflon®  
**O-rings:** Viton®  
**Sensor Head Material:** Noryl®  
**DataStick Material:** PEEK or CPVC  
**Weight:** 1.2 lbs

**Units of Measure**  
**Measurement units:** ppm, free chlorine  
**Temperature Units:** °C, °F

**Calibration‡**  
**Sample:** 1 point  
**Zero:** 1 point  
**Temperature:** point

**Other Configuration Options**  
**Sensor Filter:** 0 to 100 seconds  
**Temperature Filter:** 0 to 100 seconds

**Approvals and Ratings**  
**Immunity & Emissions:** CE Certified 89/336/EEC: CISPER 11, EN61000 (-4-2,-4-3,-4-4,-4-6, 4-8)  
**Safety:** cULus Listed; 367G E303570  
**Hazardous Locations:** Haz Loc Class 1, Division 2, Groups A, B, C, D. Max Ambient 50 °C

† Note: Class II DC power supply required  
 ‡ Note: Precalibrated at the factory

### Thermo Scientific AquaSensors Free Chlorine DataStick and AquaChlor Monitoring System

- Global support — with experience that comes from supporting our customers for over 35 years throughout the world, our water quality specialists and customer support teams offer a quick, thorough and professional response to any problem encountered.
- Focus on user benefits — we work closely with you to define your needs, and ensure you are using the monitor in a way that improves your bottom line. For more information, contact your local water quality specialists or visit [www.thermo.com/processwater](http://www.thermo.com/processwater).

#### Free Chlorine DataStick Information

Part No.	Description
<b>CL31-t-r</b>	<b>Free Chlorine Sensor Head</b>
<b>Sensor Tip (t)</b>	<b>B</b> = Process Flat <b>C</b> = Face Seal (for flow chamber mounting)
<b>Measurement range (r)</b>	<b>1</b> = 0 to 5 ppm <b>2</b> = 0 to 20 ppm
<b>DS-b-t</b>	<b>DataStick</b>
<b>Body Material (b)</b>	<b>1</b> = 316 SS <b>2</b> = CPVC <b>3</b> = PEEK
<b>Mounting (t)</b>	<b>1</b> = NPT
<b>CA-b-nw-x-y</b>	<b>Communications Adapter</b>
<b>Body Material (b)</b>	<b>2</b> = CPVC <b>3</b> = PEEK
<b>Communications (nw)</b>	<b>1A</b> = RS232 ASCII <b>3B</b> = DF1 RS485 <b>1B</b> = RS485 ASCII <b>7R</b> = Ethernet <b>2B</b> = Modbus® RTU <b>5R</b> = DeviceNet <b>2A</b> = Modbus RS232 <b>6R</b> = Profibus DP <b>3A</b> = DF1 RS232 <b>8R</b> = USB
<b>Cable Length (x)</b>	<b>1</b> = 10 feet <b>2</b> = 20 feet <b>3</b> = 30 feet
<b>Cable Termination (y)</b>	<b>A</b> = Stripped Wires

Part No.	Description
<b>AQC-d-x-y-z</b>	<b>AquaChlor System</b>
<b>Display Location (d)</b>	<b>1</b> = Integral <b>2</b> = Remote
<b>AV38 Display Configurations (x)</b>	<b>A</b> = 1 current output; 24 VDC power <b>B</b> = 2 current, 2 relays; 24 VDC Power <b>B</b> = 2 current, 2 relays; 100 to 240 VAC Power
<b>AV38 Host Communications (y)</b>	<b>0</b> = None <b>4</b> = Modbus RTU <b>5</b> = Device Net <b>6</b> = CANopen <b>7</b> = Ethernet IP, Modbus TCP, TCP/IP
<b>pH Compensation (z)</b>	<b>A</b> = Manual <b>B</b> = Automatic (w/pH DataStick)

#### Accessories Ordering Information

Part No.	Description
<b>Local Display/Controller Interface</b>	
<b>AV38</b>	1/4 DIN, Outputs, Relays, Digital Communications Options
<b>Solution</b>	
<b>RD0K9</b>	Chlorine Electrolyte, 60 mL bottle
<b>Membrane Caps</b>	
<b>DMR09</b>	Chlorine Membrane Cap
<b>SBC01</b>	Storage Cap With Sponge
Consult factory for other sensor mounting options.	

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